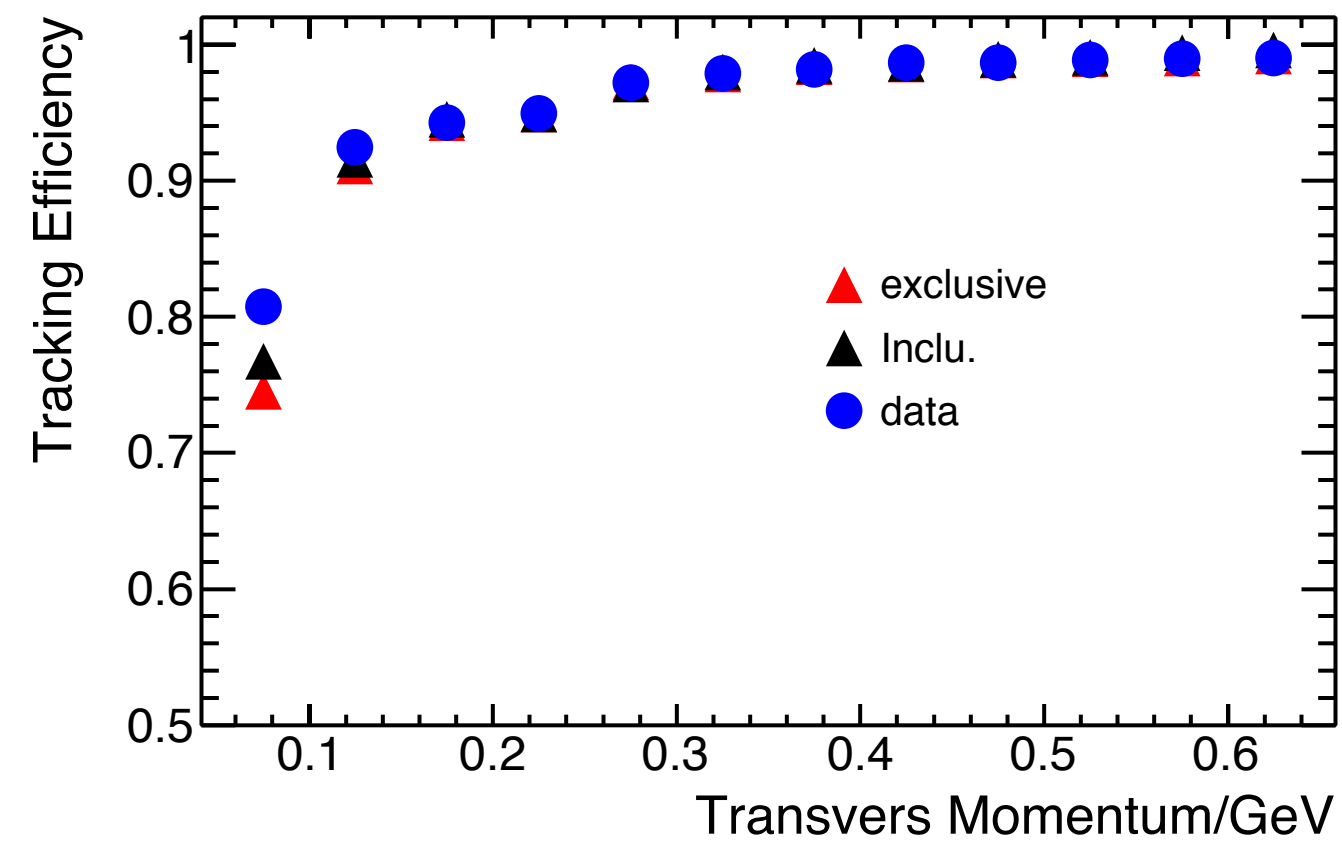


Applications of reweighting techniques in PPPiPi Analysis

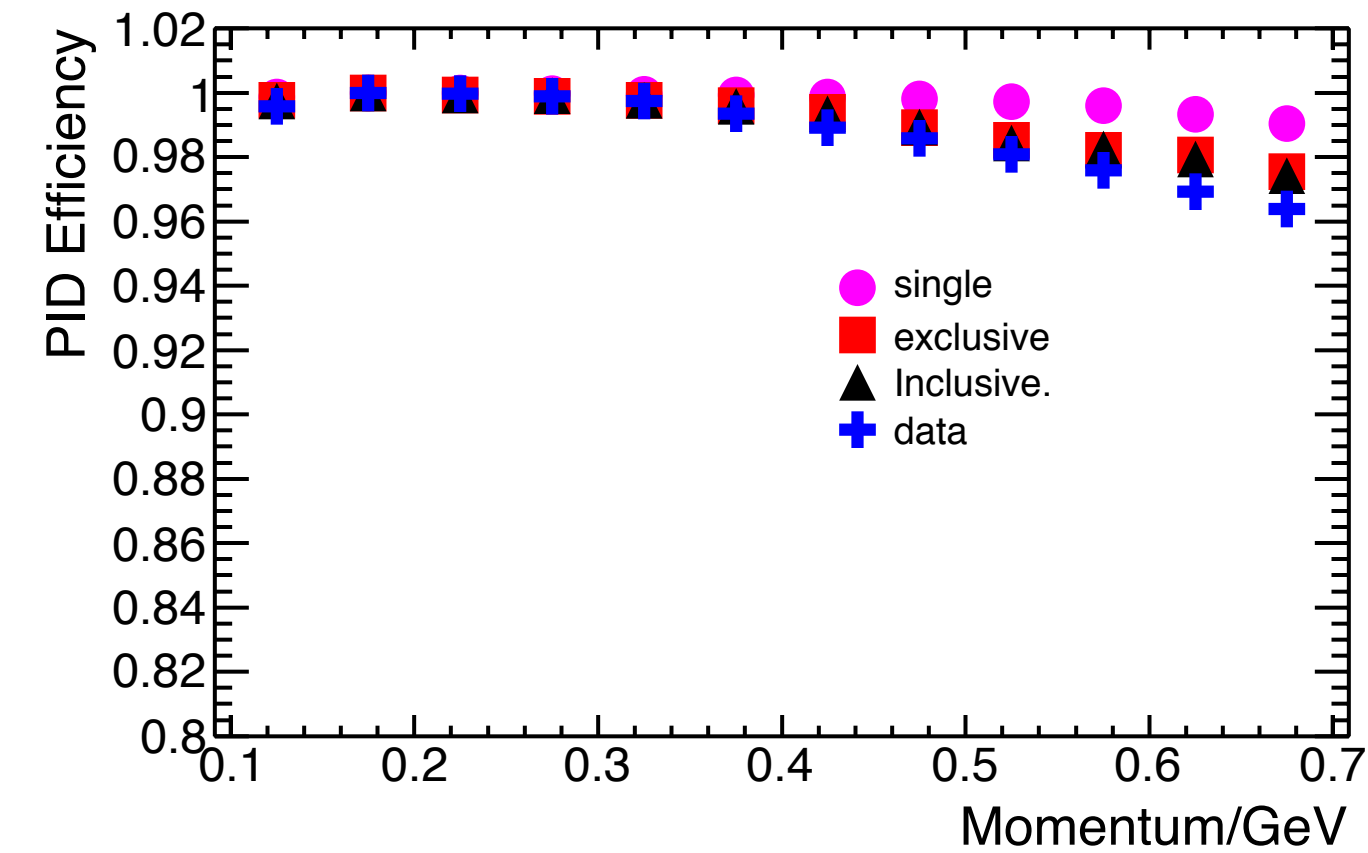
Outline

- Introduction(why to do this)
- Method(How to do this)
- Result

Introduction



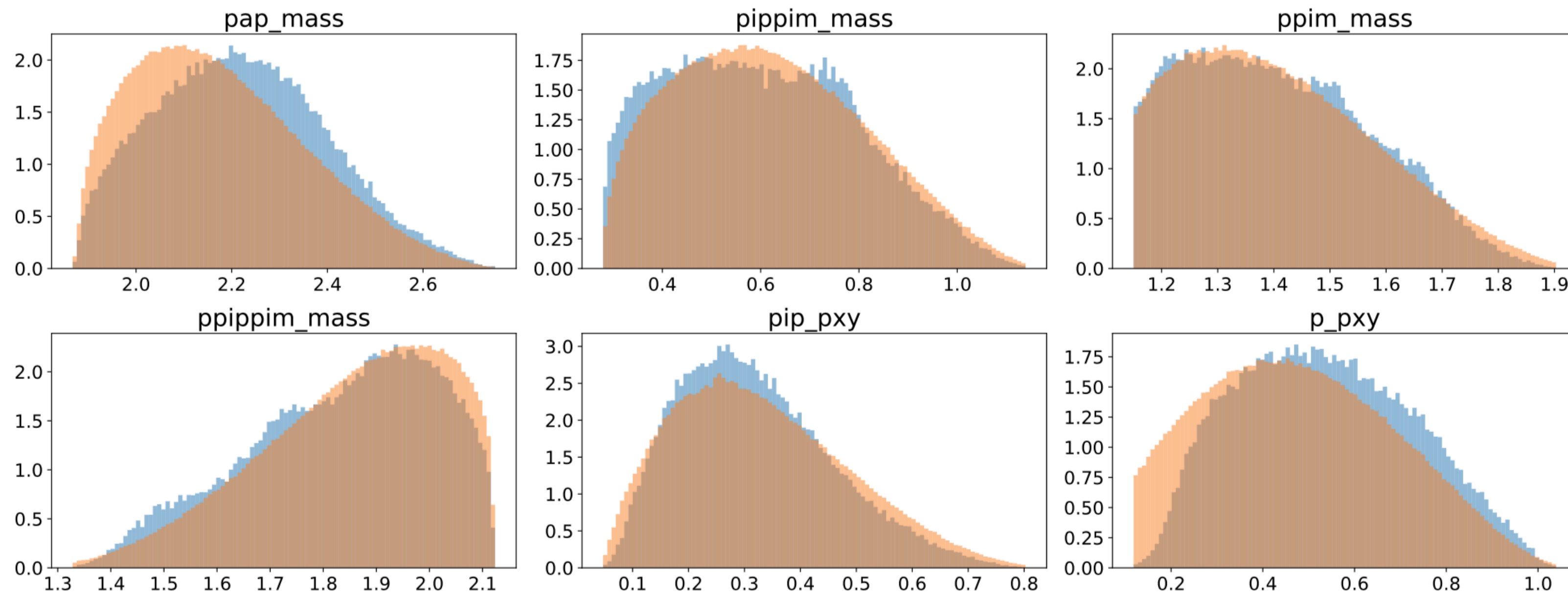
tracking efficiency of pion



PID efficiency of pion

- The tracking and PID efficiency of data and MC are sometimes inconsistent. Some inconsistency may be caused by the different distribution of data and MC.

origin distribution



MC

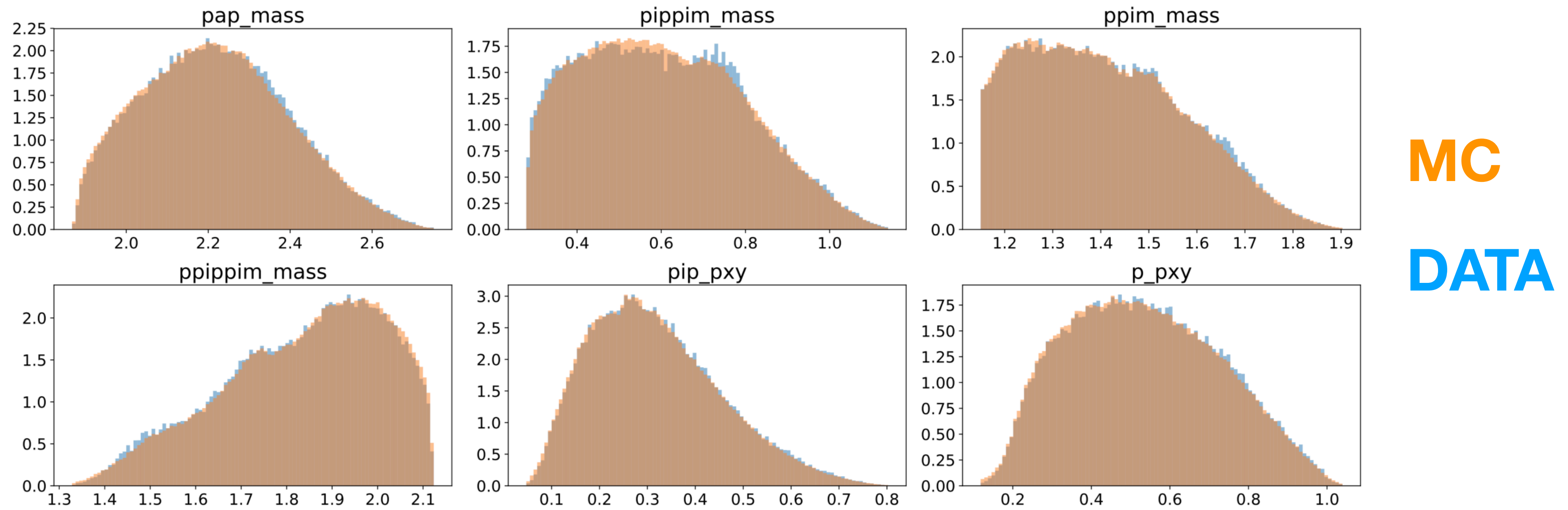
DATA

- The distribution of the invariant mass of combination of ρ 、 $\bar{\rho}$ 、 π^+ 、 π^- and the transverse momentum of data and MC are inconsistent.
- We need to find some methods to make them consistent.

Method

- Input Data and MC sample
- Use machine learning method(GBDT) to get the probability of P_{data} and P_{mc} of each event
- weight factor $W=P_{\text{data}}/P_{\text{mc}}$

Result



- After reweighting, the distribution of MC are data are more consistent with each other.

Summary

- High dimensional reweighting problem can be solved with ML methods
- The tracking and pid efficiency can be calculate again to obtain a more accurate uncertainty of data and mc
- The code are available on github https://github.com/a136522541/reweighting/blob/master/Reweight_pppipi.ipynb
- The root file are in ml2018.ihep.ac.cn